Electricity on the Farm

MONTHLY MAGAZINE FOR THE UP-TO-DATE RURAL FAMILY

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WHAT IS YOUR TITLE FOR THIS PICTURE?
(See inside back cover for rules of cash prize contest.)

In This Issue

MARCH 1938

ELECTRIC BROODERS BEST BY TEST IN INDIANA—PLANNING THE FARM WATER SYSTEM—LOWER RATES FOR ELECTRIC SERVICE—ELECTRICITY FIGHTS FROST—ELECTRIC HOUSEKEEPING AND OTHER REGULAR FEATURES

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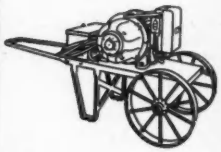

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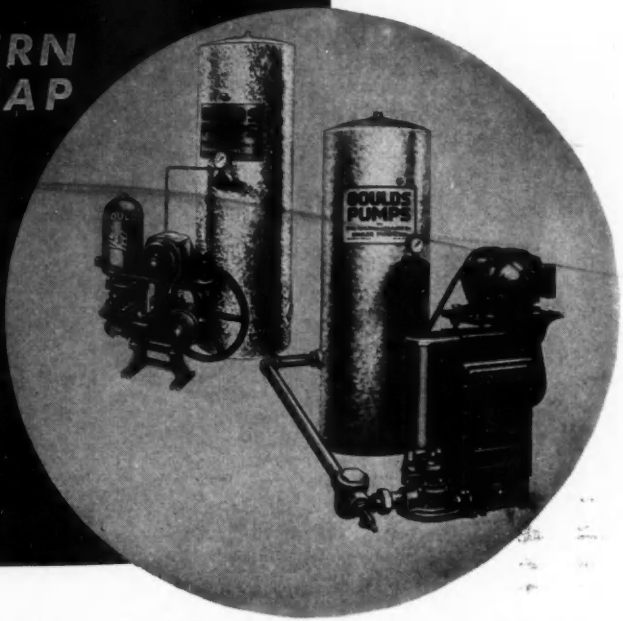

Haven't you often wished you could have the same quick flow of fresh running water from faucets in your home that's enjoyed by the patrons of big hotels?

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RUNNING WATER

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Editor's Chat

IN A FACTORY

Tom and Bill grab the big, shapeless sheet of steel. They shove it into an enormous press. Tom touches a button. The press presses. Tom and Bill lift out the steel and place it on a moving belt. Behold, it has taken shape! It is three sides of a household refrigerator with beautifully rounded corners.

How fascinating!

I am a farm boy. Wouldn't I like to do that! And $30 every Saturday night!

Tom and Bill grab another sheet of steel. They shove it into the press. It comes out three sides of a refrigerator, just like the other sheet. How interesting! Tonight they will go to a show.

Tom and Bill grab another sheet. Zip! Bang! Another refrigerator started. Speed. Big stuff.

Tom and Bill grab. They shove. They lift. One more.

They grab; they shove; they lift.

The whistle blows at 5. Tom and Bill will be free. They will take their girls to the show. They are independent, except that they must punch that time clock at seven every morning; and they must work for union wages. Yes, and occasionally they have to strike when someone tells them to or they may be laid off during the dull season. But it is a good job.

And that $30 on Saturday night! Good, hard smackers to spend. Of course when Tom and Bill gather the eggs, they gather them off the groceryman's shelf and plunk down a smacker; when they eat chicken, they catch it off the butcher's roost and plunk down a smacker. It is fun (?) hanging on a strap in the street car after work. Each week it costs a smacker. Then there's the milkman, the coal dealer, the landlord, the laundryman. By Saturday morning there may be a dollar left, or there may be a little unpaid bill at the grocery store.

On Monday Tom and Bill will grab the big, shapeless sheet of steel. They will shove and lift.

We need refrigerators. The world is better for them. We need Tom's and Bill's to make them. Their's is a good work. We hope they like it.

Ten years from Monday morning Tom and Bill will grab the sheet of steel. They will shove and lift. They have families now. They live in those unpainted houses. They get $30 on Saturday night.

* * *

Twenty years from Monday morning. Tom and Bill. They grab, they shove, they lift.

—for ground I am a Democrat

ELECTRIC BROODERS

There are many makes of electric brooders. An expert who knows his brooders could raise good chicks in any of them. Some are good for warm weather brooding. They have insufficient heat and are too poorly insulated for cold weather use. Some use fans for introducing fresh air; some for recirculating warmed air under the hover. Some are more convenient to use; some less. There are many types of heating elements and arrangements of reflectors. Some brooders are homemade with commercial heating elements and heat controls. Someone is using every kind of electric brooder made, and liking it.

We cannot tell you which is the best brooder. Undoubtedly some are more foolproof than others, easier to use or to learn how to use. You may like the Tom Brown brooder; I, the Brown Tom. One thing is true about all of them—and it applies to oil, coal and wood burning brooders, as well. This is no equipment for a mental sluggard. If you are that, tell biddy to lay her eggs under the barn and you take what you get.

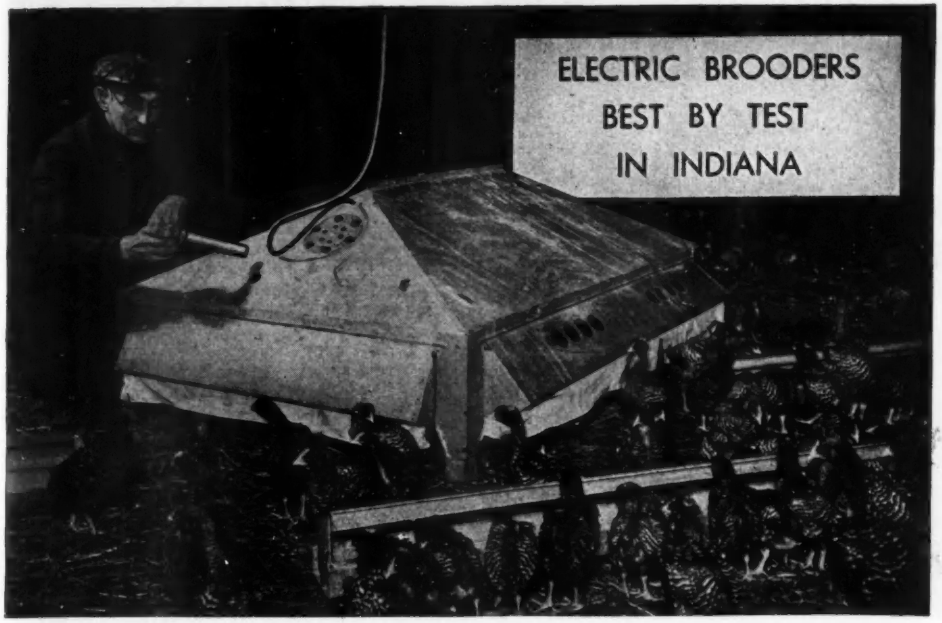
Electric brooders must be handled differently from coal brooders or oil brooders. A fan type brooder must be operated differently from a convection ventilated brooder. Electric brooding is usually cold-room brooding, and it has been very successful at temperatures below zero. Study the manufacturer's directions. Do not stop at that. Visit someone who has used one of the brooders and learned its fine points from experience. Then remember that you are dealing with live babies. Keep your head and use common sense.

GEO. W. KABLE.

March, 1938 **ELECTRICITY ON THE FARM** **Vol. II, No. 3**

Issued Monthly by
CASE-SHEPPERD-MANN PUBLISHING CORP.
Editorial-Executive Offices: 24 West 40th Street, New York

GEORGE W. KABLE, *Editor;* KARL M. MANN, *President;* FRED SHEPPERD, *Editorial Director;* I. H. CASE, *Vice-Pres. and Gen'l Mgr.;* K. H. GORHAM, *Advertising Manager;* H. S. ESSEX, *Production Manager.* CHICAGO: 6 No. Michigan Ave.—W. S. CLEVENGER, Western Manager; L. M. ROCHE, Western Representative. SAN FRANCISCO: 444 Market St., Room 305—C. H. WOOLLEY. Subscription price, 75 cents per year; single copies, 10 cents; Special Bulk Rates on Application. *Contents Copyrighted 1938 by Case-Shepperd-Mann Pub. Corp.*



Eight Different Brooders All Produce Excellent Results—Records of Five Year's Studies

By TRUMAN E. HIENTON

Mr. Hienton is Associate in Agricultural Engineering in the College and Experiment Station, Purdue University.

PERFORMANCE tests of eight makes of electric brooders on Purdue University agricultural experiment stations farms during the spring of 1937 furnished further evidence of the successful use of electric brooders in raising chicks. Eight brooders of as many makes, raised 2,640 chicks out of a total of 2,732 to the end of the brooding period using 0.42 kilowatt-hours per chick raised.

This record of performance is of even greater importance when consideration is given to the fact that the brooders used were assembled from as far west as California to as far east as New England. The brooders were operated under similar conditions in 10 by 12-foot colony brooder houses with no artificial heat supplied other than that furnished by the hovers themselves.

Records of operation of the brooders are given in an accompanying table. The first six listed were operated on an experimental farm near Bedford in Southern Indiana while the last two were in use on another experimental farm near Valparaiso in Northern Indiana. The low per cent of mortality is particularly to be noted since in no case did it exceed 5 per cent. This rate is relatively low when compared to the average chick mortality throughout the State. Continuous testing

1937 Tests of Electric Brooders on Purdue University Agricultural Experiment Station Farms

Brooder Make Number	Chicks Started Number	Mortality Chicks Number	Mortality Chicks Percent	Brooding Period Started Date	Days Number	Energy Used Per Chick Raised Brood Kw.-hr.	Energy Used Per Chick Raised Kw.-hr.	*Energy Cost Per Chick Raised Brood Dollars	*Energy Cost Per Chick Raised Cents
1	282	10	3.5	Mar. 9	56	138	0.51	4.14	1.52
2	282	8	2.8	Mar. 9	56	148	0.54	4.44	1.62
3	359	9	2.5	Mar. 16	56	136	0.39	4.08	1.17
4	394	17	4.3	Mar. 23	56	190	0.50	5.70	1.51
5	391	13	3.3	Mar. 30	56	106	0.28	3.18	0.84
6	322	10	3.1	Apr. 6	56	115	0.37	3.45	1.11
7	282	12	4.3	Apr. 8	46	139	0.51	4.17	1.54
8	420	13	3.1	Apr. 15	43	131	0.32	3.93	0.97
Average	341.5	11.5	3.4		53.1	137.9	0.42	4.14	1.25

* Energy figured at 3 cents per kilowatt-hour.

Another type of brooder used in the Purdue tests. These are midwinter broilers on an Indiana farm.

for Pullorum disease and strict adherence to a sanitation program has had its influence on the mortality rate of chicks on these farms. Good chicks and good brooding combined to produce this enviable result.

The average energy consumption per chick raised for the eight brooders, 0.418 kilowatt-hour, was about 12 per cent less than that (0.475 kilowatt-hour) reported by 48 Indiana farm operators in 1929, 1930 and 1931. This reduction in consumption can possibly be traced to greater skill of the operators in adjusting the brooders, lower mortality rates with resulting larger percentages of chicks raised, time of year when brooding was done, and perhaps increased efficiency in present brooders over those used when the previous data were taken.

During the past five years all brooding at the Purdue experimental farm near Bedford has been conducted with electric brooders. Each year six brooders were utilized and all have been operated by the same man. The effect that experience in brooder operation has had on reducing energy consumption is well illustrated in the following record of the past five years.

Consumption of Electrical Energy for Six Electric Brooders Annually at Moses Fell Annex Farm, Bedford, Indiana, 1933 to 1937

Year	Chicks Started Per Brooder Average Number	Average Mortality Percent	Electrical Energy Used Per Brooder Kw.-hr.	Per Chick Raised Kw.-hr.
1933.....	281	5.9	237	0.897
1934.....	337	6.9	186	0.592
1935.....	362	3.2	118	0.332
1936.....	366	3.9	131	0.371
1937.....	338	3.4	138	0.417
Five-year Average.	337	4.5	162	0.504

The above differences in energy consumption are not due entirely to increase in experience of the operator since it will be noted that the average consumption was slightly greater in 1936 than in 1935 with approximately the same number of chicks. Variation in weather conditions from year to year during the brooding period and changes in models and makes of electric brooders during the tests have had some effect. However, these factors could not have been sufficient to account for the decided reductions from 1933 to 1934 and from 1934 to the three succeeding years so that the change must be attributed to more experienced operation.

Some of the factors involved in operation of the brooders which resulted in this decrease in consumption included careful attention to the adjustments of the thermostats, keeping a good supply of litter on the floor beneath the hover, and adjustment of the height of the hover from the floor. The operator learned to adjust the regulator according to the response of the chicks although still adhering to recommendations of the manufacturer. Experience proved that a plentiful supply of litter on the floor under the hover was more important with electric than other brooders particularly when the chicks were just being started. Adjusting the

(*Continued on page 26*)

Ten electric brooders have been operated on this farm since 1933. It is the Fitting poultry farm near Lafayette, Indiana.

LOWER RATES FOR ELECTRIC SERVICE
HOW TO GET THEM

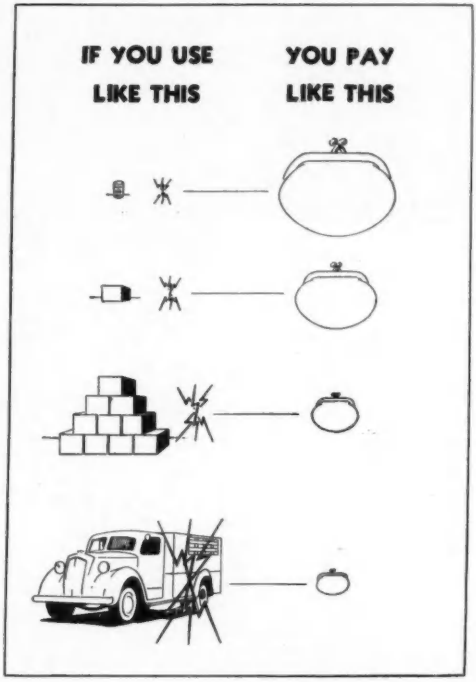
A Tip From the Editor

DO you want electricity at a low price?

Those who do, gather round. We'll go into a huddle and call a few signals for a long forward pass.

Of course, there are those who would rather use their heads to "buck the line" than to think up a good play. They stand off and crab and fume. Sometimes that's effective; but did you ever hear of anybody actually getting lower rates by "crabbing"? The percentage is low.

Public service commissions sometimes regulate rates downward. When they do, there must be some reason for it. That reason is usually increased earnings due to increased sales of current. Such reductions are relatively small and not frequent.



But do you know that in practically all sections of the United States you can cut your own kilowatt-hour cost in half or third without Commission action or without even "crabbing"? It does not make any difference whether you are buying electricity from a municipal plant, a private utility or your own cooperative power association. *The way to do it is to buy in large quantities.*

If you were buying canned goods, the cost per can would be less if you bought a case than if you bought only one can. If you bought a dozen cases, it would be still less; and a car load order would bring you the wholesale price per can. That's the way business is conducted. If you buy in wholesale quantities, it costs less to pack, less per can to ship; there's less loss in handling, there are not so many people involved, and the bookkeeping costs are less.

The same thing applies to electricity. There are production costs, delivery costs, losses enroute, handling costs and bookkeeping. The more kilowatt-hours you buy, the cheaper the rate per kilowatt-hour. And you do not need to have a friend or relative in the Company to get the wholesale rate.

Look at the rate schedule of your power company or power association. You will find that you can buy:

	Umpty kw-hrs. .... @	xxxx per kw-hr.
the next	Umpty-ump kw-hrs. @	xxx per kw-hr.
then	Umpty-ump-ump kw-hrs. @	xx per kw-hr.
all over	Umpty-umpty-ump-ump kw-hrs. @	x per kw-hr.

That is what is known as a step or block rate. If you can handle umpty-umpty-ump-ump kw-hrs., you will get it at the lowest price.

Now I don't suppose that anyone, even Popeye, could eat a carload of canned spinach. He'd be "nerts" as the boys say, to try it. But if he could trade canned spinach for canned salmon, spinach for apples, for beefsteak, for an automobile and a hound dog, then he could afford to buy spinach by the carload.

Did you read in the February issue of *Electricity on the Farm* how Joseph Kerkhoff traded kilowatt-hours for ground feed, for coal-oil, for cow's milk, for hot water, for ice and for radio music? He bought his kilowatt-hours by the "carload." Better read it. It was on page 7.

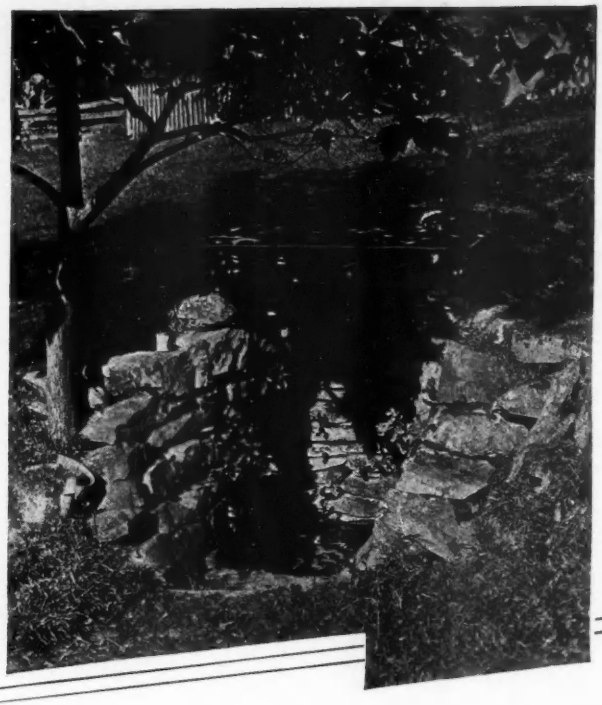
The umpty's and the x's may have different values in different places, but as soon as you are in the umpty-umpty-ump-ump class, you're "on the inside," —a wholesale buyer. When there are a lot of umpty-umpty-ump-ump users, then your association or company can afford to make a general reduction in rates. And that's the way it's done. Ask your rural service man, your county agent or your Association representative.

The surest rate reducer, whether you like it or not, is the fellow who uses the electricity.

Why do California irrigators, city manufacturers, users of water heaters and Joseph Kerkhoff get low rates? Not because of any political pull. They're just in the umpty-umpty-ump-umps.

—I'm proud I am a farmer—

Or, try this on your account book: John Smith, 2367 Congested Blvd., Chicago, wants to buy pork from you. What will you charge him per pound delivered at his home (1) if he buys one pound; or (2), if he buys a whole hog?



It used to be as simple as this. But people make pollution and springs make steps. Today this may be the beginning but not the end in farm water supply.

Photo Courtesy U. S. D. A.

Planning THE FARM WATER SYSTEM

Quantities Needed; Pump and Tank Sizes; Flow of Water Through Pipes

By B. A. JENNINGS

A WATER system for the farm needs planning. An unplanned one may result in dissatisfaction and a waste of money.

Mr. Jennings is Assistant Professor of Agricultural Extension, Cornell.

A planned water system will embrace an adequate water supply, the correct size of pump to fit both the supply and the farm water needs, the correct size of pipe to carry the water needed, and a layout of pipes that will supply water at the places where it is needed.

No one will question the need of an adequate water supply throughout the year. However, if the available supply is small one can often install a system that will give satisfaction by increasing the storage or holding capacity.

There are two items to be considered in estimating the water requirements of a farm. One is the total daily use and the second is what might be called the peak load requirement.

Table 1 on "Daily Water Consumption" gives average figures which can be used to estimate the total daily consumption. It should be remembered that these are average figures. For example, a high producing cow may use 30 gallons of water instead of the 15 given in the table.

Table 1 should be used only to determine if the source of water is ample to take care of the farm needs.

Table 1. Daily Water Consumption

	Average Gallons per Day
For each person—water in kitchen only	15
For each person—kitchen and bathroom	35
For each cow	15
For each horse	10
For each hog	2
For each sheep	1½
For each 100 hens	3

Example: What must the supply provide in 24

hours for a farm with the following water requirements.

	Gallons in 24 Hours
6 persons—35 gal. per person	210
20 cows—15 gal. per cow	300
3 horses—10 gal. per horse	30
300 hens—3 gal. per 100 hens	9
Total gallons for 24 hours	549

The source of water supply for this farm should provide at least 600 gallons in 24 hours.

The size of the pump and size of pipes must be based on the peak load, or greatest use at any one time. When we want water we don't want to wait until some cow is through drinking. Peak loads can be estimated from Table 2.

Table 2. Rate of Flow of Water

For faucet	3	gal. per minute
For cow drinking fountain	1	gal. per minute
For sprinkling ½" hose	3	gal. per minute
For sprinkling ¾" hose	4½	gal. per minute

For a dairy farm the peak load is just after the cows get through feeding and we can easily figure on about ¼ of the cows drinking at this time. Using the example above, ¼ of 20 is 5 cows at 1 gal. per minute, or 5 gallons per minute total. There should also be enough capacity so that water may be drawn from at least one faucet at the house at the same time, or a total of 8 gallons per minute for this farm.

If a modern water system having a pressure tank holding from 5 to 40 gallons, is used, the pump should have a capacity equal to the peak demand. Should the water supply not be adequate for peak requirements, a smaller pump should be used and a larger storage tank, of say 500 or 1,000 gallons capacity. The peak demand will then be taken care of out of the storage tank and that supply replenished by a slower rate of pumping over a longer period. In tanks of 40 gallons or less, there is practically no storage, and the size of tank simply determines how often the pump will start and how long it will run.

What was said in preceding paragraphs about water supply had reference to wells and springs. If the farm is dependent on rain for its supply another factor of planning is introduced. A reservoir of ample size must be provided and spouting placed around enough roof area to collect the amount of water needed.

An ordinary cistern 5 ft. in diameter with an 8 ft. depth of water holds about 1,200 gallons. For the dairy farm requiring 549 gal. per day, this would be only a two day's supply. Since we may have periods of one month without rainfall, the cistern or tank should hold enough for 30 days use. The number of cubic feet capacity of the cistern may be found by dividing the gallons used in a month (16,470 on this farm) by 7½ (the number of gal. in a cu. ft.) The tank should hold 2,200 cu. ft. which would mean about 10 ft. wide, 10 ft. deep and 22 ft. long.

To find the area of buildings which must be spouted to provide 2,200 cu. ft. of water in a month, divide 2,200 by the monthly rainfall in feet. For example, if the rainfall was 3 in. per month that would be ¼ ft. 2,200 divided by ¼ equals 8,800, which is the number of square feet of building that would have to be spouted. And you had better allow a little more so you can use part of the rain to wash the dirt off the roof before turning it in the cistern.

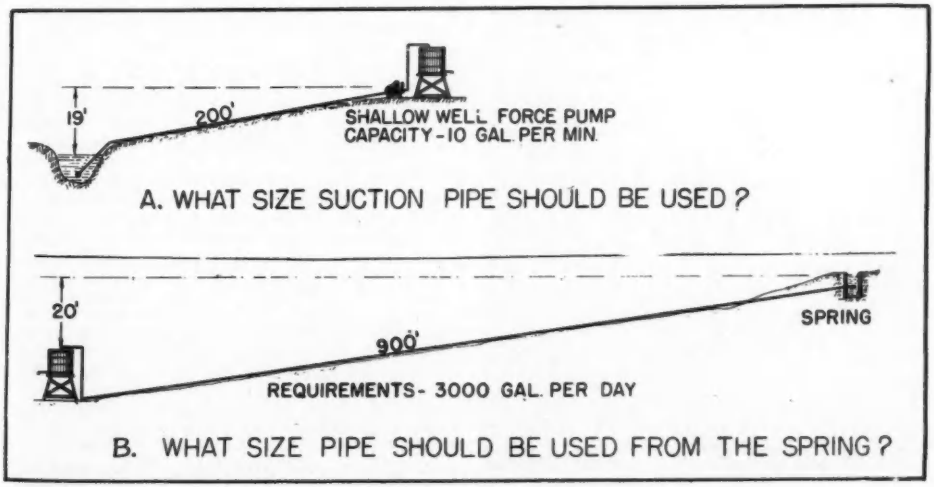
Pipe Sizes Important

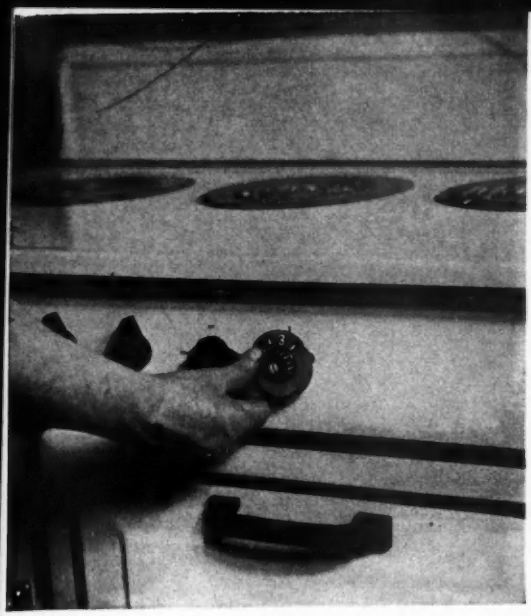
The correct size of pipe is also important in planning a water system. If the pipe is too small, it means that the water cannot get thru it fast enough. Many a pump has been blamed when the trouble was due to too small a size of pipe. Guess work as to the size of pipe may cause a waste of money by buying too large a pipe, or it may cause dissatisfaction because it is too small.

When water is forced through a pipe there is friction between the water and the pipe, which slows down the flow. The amount of friction depends on: (1) the roughness of the inside of the pipe, and the burrs where the pipe is cut and threaded; (2) the number of fittings through which the water must flow, as elbows and tees; (3) the

(*Continued on page 27*)

Fig. 1. Some problems in farm water supply.





Setting the oven regulator for 300 degrees.

THE SEEING HANDS

By VERA B. MEACHAM

Mrs. Meacham writes and travels as an avocation. Her real job is homemaker for a husband who is a Wisconsin utility official and former Extension Specialist in Agricultural Engineering.

THIS is the story of Hattie Bunker, a woman who lives in the pleasant little town of Omro, near Oshkosh, Wisconsin. She lives quite alone in a neat white house, small and square across the front, but stretching out a considerable way to the back.

That in itself is not particularly strange, nor in any way remarkable. Many women live alone in small white houses the country over, even when they are seventy-three, as Mrs. Bunker is.

But Mrs. Bunker keeps her house, gets her meals, and does her mending with only the touch of her fingers, the taste and smell of the food, and the little sounds of every day living to guide her work. She is totally blind.

We went up to see her one zero day last January. When she opened the door, I found it hard to realize that this pleasant, motherly person with a big, green, wooden-handled work bag under one arm and a small rug in her hand, could not see to welcome us in.

"It is so cold I thought you might not come," she said, as we walked through the sunny kitchen into a room midway between front and back of the house, probably a dining room when the family was larger, but now the living room because it holds the big, square, brown enamel coal stove that heats the house.

"Have you got a chair?" asked Mrs. Bunker as we settled down. "Have you got your things off? I'm glad to see you, but goodness knows, I couldn't think what you were coming way up here to—just to talk to me for. There isn't anything I can tell you that will interest anybody, without it's my new electric range. I could talk plenty about that."

"I knew for months that I was going blind," she began. "And I made up my mind that if I was going to be blind, I'd be blind by myself. I wasn't going to be pestering my neighbors and friends. I'd get so I could do for myself. So I started right in to learn to work in the dark. I'd get up early while the rest of the family were sleeping and I'd do all my work without a light."

"And you do do all of the work yourself?"

"Of course," replied Mrs. Bunker with some asperity. "I've always liked to work, but I like to do it in my own house where I can do as I please. Eight years ago when my daughter died, folks tried to get me to go into an institution where I could be taken care of and have everything comfortable.

"'What difference would that make?' I'd ask them. If I was in somebody else's house, I'd always be worrying about bumping into something or cracking a cup. At home I don't. I do my washing in a tub, but I iron my clothes with an electric iron like yours. I clean my rugs as clean as anybody's with my vacuum cleaner. I even hoist it up on my beds and clean the mattresses with it. I have an electric toaster, and just this Christmas I got one of these whistling electric tea kettles that sings out and tells me the water's boiling.

"That isn't all, either. I have a heater to warm up a room quickly, and a hair dryer and a heating pad."

Like any good housekeeper, Mrs. Bunker is

This is Mrs. Bunker

The pie goes into the oven.

proud of using modern tools and modern methods to do her work, and she is proudest of all of her electric range.

"I'll never be sorry I got it as long as I live," she said. "I was always afraid of fire. Afraid it might catch on a curtain or a towel, or the sleeve of my dress, and I wouldn't know it at first. There isn't any flame to blow around on an electric range, and I never get any burns now. I don't know just when I made up my mind to cook with electricity, but I can tell you what hurried me into it." Mrs. Bunker sat forward on the edge of her chair, her back scorning the support behind it.

"My old oil stove went to pieces all at once. There just wasn't anything left to light. It was on a Saturday, I remember. That morning I let some peas boil over. There was soot on everything—on my face, on my hands, on the walls. I scrubbed, and I scrubbed, real good, and I thought it was all off.

"A woman came in with a paper for me to sign and not long after she left a neighbor called, 'Why Hat, whatever is the matter with you?' she asked. 'I don't know,' I said to her. 'What seems to be the matter?'

"You're all black."

"I was so embarrassed," Mrs. Bunker went on reminiscently. "I must have looked a sight. And I'll bet I smudged that paper up, too, and the woman was too polite to tell me. Anyhow, I said to myself that this had gone far enough. I was going to have a new stove.

"So I called up the power company and asked the woman in the office if there was a man there who could come up to the house.

" 'What do you want?' she said in the telephone.

" 'I want to buy an electric stove,' I told her. I guess that surprised her some. Then after a while Mr. Helgeson, he's the head man at the power company, came up himself and told me all about the ranges, and we decided that the one with the burners across the back was the range for me to buy. I wouldn't have to be reaching over hot pans, nor catching a handle in my sleeve and tipping a kettle of potatoes on the floor, not with all the pans back there in a row."

Thought of Convenience Sold Range

So Mrs. Bunker bought her range, not from a model in the store and, of course, not from a picture in a catalogue, but just from the picture Mr. Helgeson painted of its convenience, and its safety, and its cleanliness.

Mrs. Bunker is not likely to forget the first day the range was in. She tells the story on herself with lots of pleasure.

"When they were finishing the wiring," she said, "Mr. Helgeson came up and stood around till they were through. Then he showed me how to turn the switches and which burner would get hot. He kept saying, 'The switch points all go up'." Mrs. Bunker laughed a little, remembering. "That didn't mean a thing to me, but I didn't let on that I did not understand.

"He went away and the young fellow who'd been helping with the wiring said to me, 'I'm going home to supper now, Mrs. Bunker, and if you want to know anything more about the range, you just call me up.'

"Then everybody went home. It was just half past five when I put my finger on the clock, and I thought I'd get some water on and make me a cup of tea. I did, but what a time I made of it. After I got the heat on I couldn't get it off. I kept turning switches one way and another until I had all of the burners going. Even the two in the oven. They were all hot.

"I said to myself, 'Dear me, this is terrible. I'll never let the neighbors know what a time I'm having. What can I do? I can't go to bed and leave the range this way.' "

"How did you get it turned off?" asked my husband.

"I called up that boy's mother and asked if he'd had his supper yet. She said he hadn't so I asked her to send him down afterwards. But he didn't wait. He came hurrying right down and turned off that stove for me. Then he showed me how to do it all over again.

"I never had a minute's trouble after that," she finished, getting up from her chair. "Wouldn't you like to see the range?"

Standing beside the range, she rubbed her hand over its smooth, glistening top. "I often laugh at the way I used to treat this range. If I were cooking more than one thing, I'd have a kettle ready to slip on when the first came off, and I'd have the dish water ready to put on the minute the rest were done. I thought I mustn't waste a minute getting something over that heat. I don't let it run me like that now. I've found that it costs me very little more than the oil stove I was using, so I just use it as I need it."

"Do you do much cooking?" he went on.

"A good bit. I know some folks when they get old just eat about one meal a day. I suppose if it is a lot of trouble to cook, it'd be easier to do that. I have breakfast, dinner and supper. There can't anybody say it's too much work to get meals on a range like this. I never had such pleasure

(*Continued on page* 25)

ABOVE: This is not a wind-electric plant. It is a high powered motor driven wind producer used to combat frost by keeping air in motion during cold weather.

BELOW: This is another type of frost killer used in the elimination of the "smudge pot nuisance." A smokeless oil burner provides hot air which is fed up the flue to the circulating fan which is motor driven. The wind machine can be adjusted to oscillate to cover any desired area of orchard. (Wide World Photo)

ELECTRICITY FIGHTS FROST

Motor Driven Propellers Mix Warm Air With Cold and Prevent the Formation of Dew

By EARL BURKE

Mr. Burke is a business analyist and writer on agricultural subjects of Oakland, Cal. He grew into writing from a boyhood on the farm.

A MOTOR-DRIVEN machine was used last year to keep frost away from 30 acres of choice apricot trees on the famous El Solyo ranch, Stanislaus County, California. This frost protector, sometimes called a "wind machine," was installed last spring to save the time, labor and expense of maintaining smudge pots to raise orchard temperatures in freezing weather. According to ranch authorities, it did all that was expected of it during California's unusual cold snap last winter and performed very satisfactorily. They are much pleased with it and now consider installing another.

The equipment consists of a 45-foot steel tower, topped by an airplane propeller driven by a 50-horsepower motor. The propeller, geared for 1800 revolutions a minute and mounted on an axle which rotates slowly, combats frost by producing a rolling movement of air for 750 feet in all directions.

The operation of this frost dispeller is based on two scientific principles:

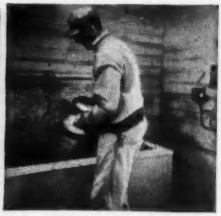
One—Under ordinary conditions the air is coldest near the ground and about a degree warmer every five feet up, at least to a certain height. So, mixing the air strata helps to raise the temperature at the lower levels.

Two—Constant movement of the air during cold spells prevents dew from forming on the trees and freezing.

Mr. V. H. Taylor, orchard superintendent, and other ranch officials checked up on similar installations for 18 months before ordering the apparatus. They were convinced it could not only solve the frost problem but save considerable money besides. According to Mr. Taylor, the saving as compared to the smudge pot method is amazing. Considering that the device serves 30 acres, its installation cost averages $90 per acre. Under El Solyo's electrical set-up, the operating cost is only 40 cents an hour—just 1⅓ cents an hour per acre. The ranch's figures on smudge pots show an installation cost of $65 per acre and depreciation averaging $6 per acre annually. Last year smudge pots were burned a total of twelve hours and the operating expense was $21.60 per acre. That works out to $1.80 an hour per acre, as compared with 1⅓ cents for the tower.

In addition to being more economical, there is a considerable saving in labor and time. When a cold snap approaches, the frost protector can be put into service immediately by throwing a switch, as compared with the time required to set out the rows of smudge pots and keep them filled.

"I HAVE NEVER LOST A SINGLE CAN OF MILK SINCE USING MY ESCO COOLER"
says LOUIS BANNOW, MICH.



Say "GOOD-BYE" to REJECTED MILK with an ESCO "NI-AG-RA"

★

READ WHAT THESE ESCO USERS SAY:

"My ESCO Milk Cooler certainly is doing a wonderful job as my milk is 38° cold in the morning when leaving my dairy. Needless to say my bacteria count runs very low, and I am well pleased with my installation."—Frank Thorpe, Mass.

●

"Since installing my ESCO Milk Cooler we have never had a can of milk come back, and in the hottest weather our operation cost was about 80c. We have never had any trouble cooling our milk down in an hour."—Ed. Sager, N. Y.

●

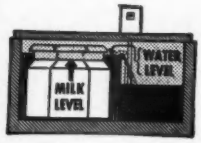
"My ESCO Cooler has proven to be the greatest money-saving, convenient and satisfactory piece of equipment I have ever purchased for my dairy."—A. L. Little, N. C.

●

"The ESCO Milk Cooler I purchased in 1928 has been in constant use ever since. Operating and upkeep expenses have been very nominal. I am well pleased with this very important piece of my Dairy Equipment."—C. J. Rice, New Hampshire.

●

"That's a great milk cooler . . . wouldn't be in business without it. Only costs me $1.67 per month to operate."—Eben Haggett, Maine.



6-can capacity . . . 3 cans of night milk . . . Water is above milk level in all cans . . . all the milk to the very top of every can will be cooled to BELOW 50° in an HOUR OR LESS.

Pat. Nos. 1,782,840 1,982,570

3 morning cans added (6 in all). Water level AUTOMATICALLY ADJUSTED. All milk cooled in one hour or less . . . and ready to ship.

You can produce better milk and make more money if you cool your milk properly. Install an Esco "NI-AG-RA" Electric Milk Cooler. It pays for itself from the very start. It puts an end to rejected milk from improper cooling and it costs so little to operate.

The New "NI-AG-RA" cools milk better and faster because of the exclusive patented Neck-High Water Leveler. This remarkable device keeps a constant level of icy cold water up around the neck of every can . . . whether one can, half or full capacity is in place.

You also get in the new Esco "NI-AG-RA" complete circulation and positive controlled agitation. Cools all the milk to the very top in every can to 50° or lower in one hour or less. Full storage capacity for both milkings. 2- to 27-can capacities.

No other milk cooler has all these exclusive features.

WRITE TODAY. Send postal telling how many cans of milk you ship each day. We will send you complete information. Easy payment plan can be arranged.

ESCO

ESCO CABINET CO.

664 E. Biddle Street — West Chester, Penna.

ELECTRICAL HOUSEKEEPING

Conducted by GAIL MEREDITH

DINNER IN A DISH

I SUPPOSE the only thing that would really satisfy me in this contest business would be for Mr. Kable to say, "Now Gail, take all the pages you want and just print every single one of those letters about one-dish meals, or whatever you call 'em. Never mind the articles on seed cleaning, or water systems, or milking machines in the front of the magazine, go ahead. Use it all."

But I don't believe he will, so I've had to select a scant half dozen letters from different parts of the country and about different combinations for the dinner in a dish. To begin with I give you Mrs. Earl Stephenson's recipe for it. Mrs. Stephenson lives is Summittville, Ind.

4 tbsp. butter
1 medium onion chopped
2 green peppers, sliced
1 lb. hamburger
1½ tsp. salt
¼ tsp. pepper
2 eggs
2 cups fresh cut corn or canned corn
4 medium tomatoes, sliced
½ cup dry bread crumbs

Put butter in skillet and lightly fry pepper and onions for three minutes. Then add meat and blend thoroughly. Add seasonings. Remove from fire. Stir in eggs and mix well. Put 1 cup corn in baking dish, then half of meat mixture, then a layer of sliced tomatoes. Then another layer of corn, meat and potatoes. Cover with crumbs. Dot generously with bits of butter. Bake in a moderately hot oven 35 minutes.

Dinner goes into the oven in a single dish.

From Petersham, Massuchetts, Mrs. George B. Gale writes us that the favorite one dish meal in her family is stew.

"Just plain old fashioned stew," says Mrs. Gale. "Most people, of course, serve it with dumplings. My mother used to put in what we called 'Keene crackers,' very much like our common crackers, today. But my children like it best on bread, and call it 'soup on bread.'

"We often buy an edge bone and, after the steak and a pot roast have been taken from it, I put the bone in a big kettle, and give it a long cooking. Then I let it cool so that I can remove most of the fat from the broth and separate the bone from the meat. The kettle containing the broth and meat is returned to the stove, and sliced carrot, onion and potato are added, and cooked until tender. Then I add thickening as for gravy, season with salt, pepper and celery salt, dish it up into a great bowl, and call the family to enjoy it. Beef or pork bones left from canning meat make just as good stew, and left overs from a roast make even better. With piles of bread, some kind of pickles, and fresh apple pie for dessert, 'soup on bread' makes a meal hearty enough and good enough for any one.

"It is easily prepared; it is economical; it is well balanced. You have your protein, your starch, your fat, and two vegetables rich in minerals. Also it is a good meal to prepare for the men and children to warm up when the cook takes a day off."

Skipping the whole way across the United States to Washington we get this recipe that Mrs. Roy H. Egbert of Opportunity calls Tazliane.

1 package noodles
1 can corn, whole kernels
1 can tomato soup
1 onion
1½ lb. ground beef
1 green pepper
1 small bottle ripe olives
½ lb. cheese

Method. Boil noodles in salted water until tender. Drain. Fry onion and pepper; when tender add meat and cook until seared. Then add everything but the cheese and olives and simmer for ten minutes. Add the cheese and olives and bake for half an hour.

I do not mean to make you dizzy shuttling back and forth across the country, but Mrs. Daris V. Nutter does live in Greenwood, West Virginia. You'll like her letter as well as her recipe, I know. It sets a person up to see how a fellow professional wriggles out of a tight spot. Don't you think so?

"This dish originated," Mrs. Nutter says, "as many do, in a moment of emergency. We had bought half a beef of a neighbor, and for a

MONARCH

Convenience and Safety are

BLIND MRS. BUNKER'S CHOICE

• The minute you see the "3-in-line" All Electric Monarch Range, you'll realize, as Mrs. Bunker does, that it's the last word in convenience and safety. And that's important to you too, isn't it?

The combination coal and electric model is another famous Monarch Range that you should see. Thousands of electrified farm homes have welcomed this unique combination as the answer to the needs of the farm kitchen.

It is exactly what it seems to be—a combination range that burns hard fuel or electricity. There's a regular coal-wood firebox that makes an ideal heater for homes needing heat in the kitchen. There's a regular oven that can utilize the heat from the coal-wood firebox. And that same oven is an efficient ELECTRIC OVEN, with double units for baking and broiling and automatic temperature control!

You can heat that remarkable oven partly with the coal fire and partly with electricity—or with electricity alone. Truly, no range was ever built before to meet the requirements of farm homes so wonderfully as this one.

See your Power Company—but also send this coupon for the illustrated booklet, "Hands That See." It tells the amazing story of how blind Mrs. Bunker of Omro cooks with electricity.

MALLEABLE IRON RANGE COMPANY

123 Lake Street • Beaver Dam, Wisconsin

Send Coupon for "HANDS THAT SEE"

MALLEABLE IRON RANGE COMPANY
123 Lake Street, Beaver Dam, Wisconsin

Please send me a copy of the pictorial story of blind Mrs. Bunker, entitled "Hands That See"—also full details about your combination coal and electric Model CE19.

Name.....

Address.....

City..... State.....

Upper: It is cooked on top of the stove in a single kettle. **Center:** Or comes out of an electric roaster. **Lower:** Or simmers along in a deep well cooker tucked away out of sight in the lower drawer of a range like this.

couple of days I had been very busy canning beef. In fact, I had been so busy getting it all in jars I forgot to save the nice steak out for supper. At the last moment the man of the house went through the kitchen saying that he was all ready for steak for supper.

"What was I to do? There was nothing left but some scraps I was going to use for soup bones. There was a good bit of meat on them, but only soup meat, I thought. And steak was what I had to have.

"From the joint where I had cut all the steak, I managed to cut six cubes of tender meat two inches thick and three inches square. First I rolled the steak cubes in one cup of flour to which I had added salt and pepper. Then I put them into a very hot skillet which contained a few pieces of suet to furnish the grease to saute the meat.

"I browned the meat on all sides until deep brown; then I put the pieces into a casserole and covered them with boiling water, put them into the oven and baked them until they were tender and all the water was gone. Just before sending it to the table, I poured over the meat the following sauce.

¼ lb. butter
1 cup strained, canned tomatoes
2 tbsp. chopped onion
1 tbsp. Worcestershire sauce
¼ tsp. pepper
½ tsp. salt
½ tsp. paprika
2 tbsp. vinegar or lemon juice

Put the butter into a skillet and add, a little at a time, all of the other ingredients which have been mixed together. Stir constantly until the butter is melted and all of the ingredients have been added, and the whole sauce begins to simmer. Prepare it over the lowest heat on your range, and never let it boil. As soon as it begins to simmer pour over the meat and serve at once.

Mrs. Gauffon of Knoxville sent me two such good recipes that I was hard put to it to choose which one to give you. But the vegetable casserole is different.

8 tiny potatoes
8 baby carrots
1 small cauliflower
1 cup peas
½ lb. cheese, grated
2 cups medium white sauce
Parsley for garnish

Cook vegetables and drain well. Place in casserole. Add cheese to hot white sauce, and stir until melted. Pour over vegetables. Place casserole in moderate oven until thoroughly heated. Serve with whole wheat muffins.

A Favorite Among the In-Laws

Then to finish off, here is a letter about a dish with chicken and the success it had with a whole family of in-laws.

"The casserole dish my family of eight is especially fond of," writes Mrs. Robert Ellis, Jr. of Camden, O., "I call chicken gumbo. The first time I made it, my husband said, 'Don't you ever dare cook chicken any other way again!'

"When we had our family reunion, we decided to have chicken for the main meat dish. All the other women fried theirs, while I, just to please my husband, made a gumbo. When my sisters-in-law saw mine, they exclaimed, almost in chorus, 'Well, my husband won't eat any of that, for he doesn't like spiced meat, especially when it is chicken—takes away all the delicate flavor of the bird.'

"Believe it or not, every one of their husbands ate it, came back for more, and asked me to give the recipe to their wives, while their beautifully

Part of Mr. Jongbloed's herd of 85 cows at milking time.

Saves $140 a Month with McCORMICK-DEERING Milkers!

"I highly recommend McCormick-Deering Milkers to all dairymen who want to enjoy trouble-free and efficient dairy operation," writes Dick Jongbloed, Jr., of El Monte, California, whose investment in three double unit milkers *saves him $140 a month.*

"McCormick-Deering Milkers are, in my estimation, all you have represented them to be. Since I purchased three double units my milking troubles have disappeared and the quality and quantity of butterfat have been increased.

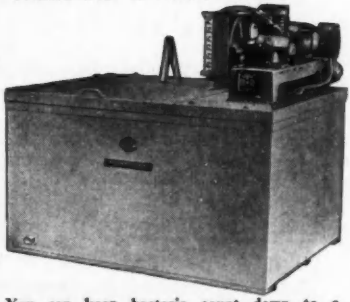
"I find sanitation easy to achieve, due to the easy cleaning qualities of your equipment. Naturally, this has reduced my bacteria count to a minimum."

• • •

Mr. Jongbloed is one of thousands of dairymen who have found McCormick-Deering Dairy Equipment profitable and satisfactory *by actual experience.* This line of Milkers, Milk Coolers, and Cream Separators is quality-built throughout, designed for years of service, and economical to use. Ask the McCormick-Deering dealer to show you how this equipment can help you make more money.

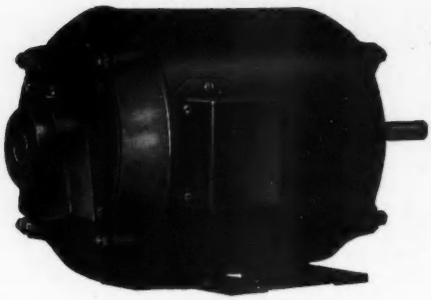
INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
180 NORTH MICHIGAN AVENUE CHICAGO, ILLINOIS

Mr. Jongbloed (right) gets first-hand information about McCormick-Deering Milkers from J. Norris, salesman.



You can keep bacteria count down to a minimum with a McCormick-Deering Milk Cooler. This is the six-can size.

McCORMICK-DEERING
MILK COOLERS • MILKERS • CREAM SEPARATORS



GRIND YOUR FEEDS with the Greatest of Ease

Since Feed Grinding is part of the business of farming, grind your feed the economical business way. Use Century Motors for power.

By adding this extra hired hand, you can do your feed grinding any time you want to—do the job better and faster—save a lot of time—and avoid unnecessary, tiresome work.

In addition—you can use Century Motors for elevating silage or conveying feed to storage bins.

Use Century Motors—they have proved their value and reliability ever since the early days of rural electrification.

CENTURY ELECTRIC COMPANY
1806 Pine Street St. Louis, Mo.
Offices and Stock Points in Principal Cities

Century
MOTORS
UP TO 600 H. P.

browned, fried chicken went a begging.

"I don't want to sound egotistical, but honestly, it is good, so here it is.

1 or 2 chickens cut in pieces as for frying.
Fry in butter until brown on all sides.
Place in large casserole in layers.
Between each layer put the following mixture.
1 small jar chili sauce
2 small onions minced
1 small can mushrooms, diced
1 green pepper, diced
1 glass pimentos, cut in strips
1 cup chopped celery

Over all pour gravy from skillet to which has been added half a cup of hot water. Bake in 350 degree oven for one hour.

• • •

TAKING CARE OF THE TOASTER

TO keep your toaster clean, brush the crumbs out with a soft brush, and give the metal a flip and a polish with the dish towel. If it gets a smear of butter or someone daubs it with strawberry jam, wash it off without getting the electrical parts, the wiring or the switch, wet.

Water is a conductor of electricity, you know. If you get the insulating materials in any electrical

device wet, you give the insulation a chance to absorb water. If it does, that water-soaked insulation may become a conductor of electricity itself, giving you practically unlimited chances for short circuits.

The simple safeguard is to keep the wiring of any electric appliance out of water.

If your toaster was made by a nationally known manufacturer, very likely it was approved by the National Board of Fire Underwriters. Reliable appliances and equipment are. That means it is well built and strong. It is safe to use and it has every prospect of long and useful life.

Should it meet with an accident, you can get the necessary parts for repairs from the firm that sold you the toaster. Probably your toaster carries a guarantee for free sevice for a certain definite length of time.

There is not much to learn about the operation of a toaster. You just plug in its cord. Of course, you do push the plug in straight. No matter what time the clock says, no matter how hurried you are, you do not, I hope, thrust the plug at the receptacle with one eye on the toaster and the other on the eggs frying on the range, jiggling it

back and forth in an effort to push it in.

If you do, you are apt to see a spit of blue flame from one terminal to the other. The engineers call this arcing. And they warn us that these arcs pit the terminal plugs. If they become badly pitted

WONDER COOKIES

Prize Winning Letter for December

This isn't a cookie to bake on a busy Saturday morning for the children's lunch box, nor to do in a hurry late some afternoon when you discover the cookie jar is low. This is a very special cookie. If you are twenty and newly married, you'll want it to knock the girls for a row at parties, or to show your mother-in-law what a whiz you are. If you are fortyish, you'll want it to show your new daughter-in-law that you know a thing or two about this fancy baking yourself.

Don't mind me, I was just fooling. I chose it really, out of hundreds of grand recipes, because it is quite different and quite delicious. Polly doesn't say so, but you mold the cookies in your hands, and bake them, I discovered, at 350° for 15 to 30 minutes depending on the size of the cookie. I got tired of making wreaths, and I made them in balls, in sticks as big around as my little finger and no longer, and in fat new moons. I noticed that everybody reached for a half moon first, so apparently they look the nicest.

Good luck with them.

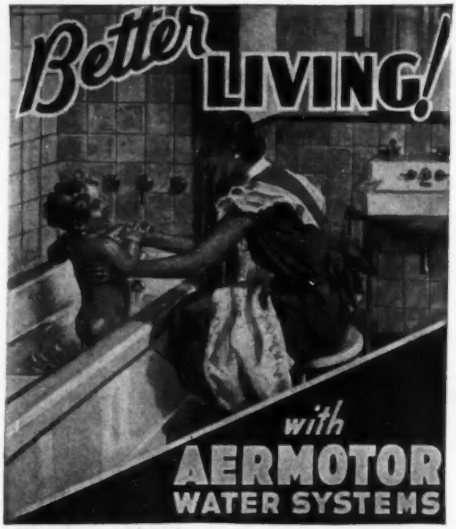
"This recipe for cookies which I am sending you is a prize recipe that I am parting with for the first time —they're delicious in flavor, and precious in value.

"Method: I cupful butter, creamed well; ½ cupful powdered sugar, cream with butter; 2/3 cupful finely ground almonds; 1½ tsp. vanilla; 2 cupfuls general purpose flour.

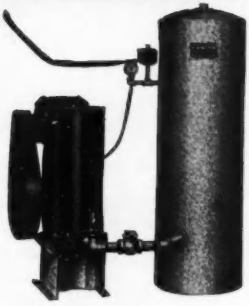
"Shape into wreaths. Dip into white of egg. Bake, and roll in powdered sugar. If you prefer, you can sugar them before you bake them.

"Hoping that these will tickle your palate, I am,

"POLLY VON SEHT,
"Scandia, Minnesota."



When you think in terms of your family's comfort—of your own personal comfort, you will realize the importance of ***running water.*** Besides, running water lightens household duties and leaves many extra minutes to spend every day as you wish.



Enjoy these ***better living*** conditions to the fullest with the installation of an **Aermotor Electric Water System.** It is as modern as today, and with ***more*** exclusive features than you ever expected to find in a water system.

Compare an **Aermotor** point by point with any automatic system. You will find that ***only*** **Aermotor** offers you ***so much.*** Notice the quality and the extra value that is apparent everywhere. Still, with all these advantages, these outfits are offered at traditionally low **Aermotor** prices.

SEND for this BOOK

AERMOTOR COMPANY,
2500 Roosevelt Road, E-3
Chicago, Illinois

I am interested in an **Aermotor Water System.** Send "Facts" Book.

Name .....

Address .....

Town..... State.....

MILK AND SEPARATE WITH ELECTRICITY THE DE LAVAL WAY

De Laval Separators:
—Skim cleaner under all conditions
—Last longer
—Run easier
—Give greater satisfaction

De Laval Milkers:
—Milk perfectly
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—Save time and labor
—Make milking a pleasure

The power requirements of De Laval Separators and Milkers are low and operating costs are proportionately small. See your De Laval dealer for complete information. There is a De Laval Separator and Milker for every need and purse.

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A Cyclone EXPANSION HOVER ELECTRIC

BROODS BETTER CHICKS FOR AS LITTLE AS A CENT A PIECE . . . .

EXPANSION HOVER GIVES ½ MORE BROODING ROOM FOR GROWING CHICKS

FREE INTERESTING NEW CATALOG — WRITE NOW TO

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9" x 3' SOUTH BEND LATHE

New Low Terms ONLY $6.00 A MONTH

Ask for FREE *Catalog*

$85 LESS MOTOR DRIVE

WRITE for details on this new 9" x 3' Workshop Precision Lathe, back geared, screw cutting. Made in 8 different drives, 4 bed lengths. 38 practical attachments available for use with this lathe. Weight 320 lbs. crated. Ask for catalog 18K—sent Free, Postpaid.

SOUTH BEND LATHE WORKS
328 E. Madison Street — South Bend, Indiana, U. S. A.

they will not make good contact. An arc may even burn out the heating element, or the cord, or the fuse at the meter.

And there is another thing, too. I do hope you are not in the habit of leaving the toaster turned on after the toast is done, and everyone is through eating. The wires in any electric heating element are built to last a certain number of hours. If you keep on running current through the wires of your toaster when you are not making toast, you just waste part of its useful life.

Besides, carelessness in leaving any heating device on when you are not using and watching it, is a bad habit to fall into. It creates one of those things they call fire hazards.

March Contest

"IF A WOMAN PLANNED THE KITCHEN"

Perhaps it sounds to you as though this subject took in quite a lot of territory. It needn't. Aren't there things about your kitchen you'd change if you were planning it. I'm particularly interested in what you think about shelves and cupboards, drawers and cabinets. Would you have them open or hid behind doors? Would you leave room for a table so you could eat in the kitchen or would you squeeze it down to a workshop, no more? I hope I'll hear from folks in every part of the country on this, so wherever you live, do take time out and tell me what YOU think.

We will give you five dollars for the letter we print, or regular rates if we use your letter later.

Send in your letters, please to Gail Meredith by February 20. The address is 1026 Seminole Highway, Madison, Wis.

IN reviewing technical developments of the past year, one of the large manufacturers states that the cost of operation of a typical household electric refrigerator has been reduced to less than half that of 1928; *the weight has been reduced from* 202 *to* 120 *lb.; the cooling rate has been increased from* 337 *to* 530 *heat units removed per hour; and the amount of ice made increased from* 0.6 *to* 2.0 *lbs. per hour.*

Bless the Ladies Dept.

Husband: "I've been thinking it over, dear, and I've decided to agree with you."

Wife: "It won't do any good. I've changed my mind."

"See here, Tommy," said the teacher—"you musn't say, 'I ain't going.' You must say, 'I am not going; he is not going; they are not going; we are not going'."

"Gee," geed Tommy, "ain't nobody going?"

The Seeing Hands

(*Continued from page* 15)

in anything in my life as I have had from this range."

"That reminds me," I put in, "I understand that your apple pies are the best in Wisconsin."

"Oh, pshaw, whoever'd be telling a thing like that! They aren't anything to brag about. It's only that they are so well baked in this electric oven. I take my finger real careful and set that oven at 300; then I bake them for an hour. That bakes the lower crust so well that you have to be careful or the pie'll slide right out of the tin. And the insides are baked just right, too."

"You can get the temperature all right from this clever control," said my husband, "but what about the timing?"

"My clock strikes," answered Mrs. Bunker, turning toward him, "and I can open the door and put my finger on the hands to tell the time between."

But of course Mrs. Bunker does not cook all of the time. She has her community interests, the Star, the Relief Corps, and the church society to engage her time.

"I belong to the society but not to the church," she observed. "I've gone to all the churches. They all have good in them. If I had my way, there'd be just one church—and I'd go to that."

Then the radio brings her news and music, stories and drama. Betty and Bob, Ma Perkins, One Man's Family, and the Folks at the End of the Road are neighbors of Mrs. Bunker who call on her week after week. She invites them in by moving the dial back and forth till she hears their voices.

"Every now and then," said Mrs. Bunker as we were putting on our coats. "Every now and then somebody gets the notion nowadays that I would be better off if I'd go into a Home. They keep telling me I ought to go to the Masonic Home at Dousman, because it's such a beautiful place and it would be so nice to live there.

"'What do I care?' I say to them. "It wouldn't make any difference to me if it was all gold. It wouldn't be home."

Cow Clippers

CLIPPING cows flanks and udders is a potent factor in clean milk production, particularly during the winter months when the herd is confined. Clipped cows stay cleaner, reducing the milk bacteria count.

Hand operated machines may be adapted for one-man jobs by clamping an electric motor to the standard and belting to the wheel replacing the crank. A slow speed motor is desirable to reduce pulley sizes. Two types of electric clippers are available. One drives the clippers by means of a flexible shaft, the motor unit being suspended from the litter carrier track or strapped to the operator. The other has the motor integral with the clipper head. The directly connected job is preferred by many dairymen and represents the latest development in animal clippers.—W. C. Krueger, *New Jersey Extension Service.*

You can have the conveniences of city water by installing a WESTCO pump. All the water you want when you want it—and no work.

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ORIGINAL TURBINE TYPE

WITH BRONZE PATENTED REMOVABLE LINERS

ALL PURPOSE PUMP *for* YOUR FARM HOME

This WESTCO water system for farm and suburban homes, small industrial plants, greenhouses, schools, booster service, etc., is 100% automatic. Equipped with famous WESTCO Bronze Patented Removable Liners that protect the casings. Low upkeep. Quiet; no waterhammering; no pounding.

Install a WESTCO water system on your farm and enjoy the advantages of a city dweller. Save time, labor and money. With a dependable WESTCO TURBINE PUMP, you are assured of running water for every requirement. Quiet running; automatic; economical; simple; only ONE moving part—the BRONZE IMPELLER that operates with no metal-to-metal contact. Patented REMOVABLE BRONZE LINERS protect casings—exclusive WESTCO feature. Mail the coupon today for complete information. You owe it to yourself and family to own this economical water system.

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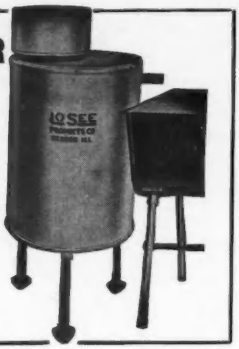

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Send FREE catalog of Deming Water Systems . . . for ☐ SHALLOW WELL ☐ DEEP WELL

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Electric Brooders

(*Continued from page* 10)

height of the hover from the floor proved to be a deciding factor in the amount of energy used by the brooder. Where the brooder was not equipped with adjustable legs or lifting device, and could not be lowered nearer the floor, it was sometimes necessary to use larger quantities of litter around it to reduce the amount of air which passed beneath the hover.

Indiana farm users of electric brooders find them to be as satisfactory as those used in the Purdue tests. Ezra VanAuken of Route 6, Kokomo, is using three, having started using them in 1930. Harry Fitting, who trap nests his breeding flock, has been using ten electric brooders on his poultry farm near Lafayette since the fall of 1933. Orval Beuoy of Matthews, whose flock has led those in the county keeping flock records in cooperation with the Purdue Poultry Extension Department, started brooding his pullets under electric hovers in 1930. Many others have compared electric brooders with those heated from other sources of heat energy and then selected the electric. An outstanding example of this kind is found at the High View Egg farm near Lakeville, Indiana. In 1936, records were kept of the cost of operation of one electric in comparison with nine heated by kerosene. The difference in cost in favor of the electric was so marked that the kerosene brooders were replaced entirely in 1937 with those heated by electricity.

DUCKS are very timid and afraid of the dark. Modern duck farms use all night electric illumination to keep their ducks from stampeding. Electricity is used extensively on quail, pheasant, and game farms for incubating, brooding, control of humidity and ventilation, and for water pumping and heating.

Female of the Species

"Daddy, I just killed five flies, two male and three female."

"How do you know that that's what they were?"

"Two were on the writing table and three on the mirror."

—*Spartan Spasms.*

—*I'm proud I am a Farmer.*—

The Farm Water System

(Continued from page 13)

size of the pipe; and (4) the speed of flow of the water through the pipe.

The effect of friction is measured in head (or height of water) in feet required to force a given quantity through the size of pipe in question. If the pipe slopes down hill from a reservoir, the elevation of which provides the head necessary to produce the flow, then this available head is said to be "lost" in overcoming friction. If a pump is forcing water up hill through a pipe, the work to be done is to lift the water to that height and also to overcome the resistance due to friction. The sum of these two is the actual physical lift that the pump is working against.

Table 3. Frictional Resistance in Feet of Head per 100 Feet of Galvanized Iron Pipe, for Various Rates of Flow of Water

Gallons Flowing per Minute	Sizes of Pipe, in Inches							
	½	¾	1	1¼	1½	2	2½	3
	Frictional Loss in Feet per 100 Ft. of Pipe							
0.5	1.4	0.2						
1	5.2	0.7	0.2					
2	18.4	2.4	0.6	0.2				
3	39.0	5.2	1.2	0.4	0.2			
4		8.9	2.1	0.7	0.3			
5		13.3	3.1	1.1	0.4	0.1		
6		18.6	4.4	1.5	0.6	0.2		
8		31.5	7.4	2.5	1.0	0.3		
10			11.2	3.8	1.5	0.4		
12			15.6	5.3	2.2	0.5		
14			21.0	7.1	2.9	0.7	0.2	
16			26.6	9.0	3.7	0.9	0.3	
18			33.0	11.2	4.5	1.2	0.4	
20				13.6	5.5	1.4	0.5	0.2
25				20.6	8.3	2.1	0.7	0.3
30				29.0	11.6	2.9	1.0	0.4
35				38.5	15.5	3.9	1.3	0.5
40					19.8	5.0	1.7	0.7
45					24.6	6.2	2.1	0.9
50					30.0	7.5	2.5	1.1
75						15.8	5.3	2.2
100						27.0	8.9	3.7

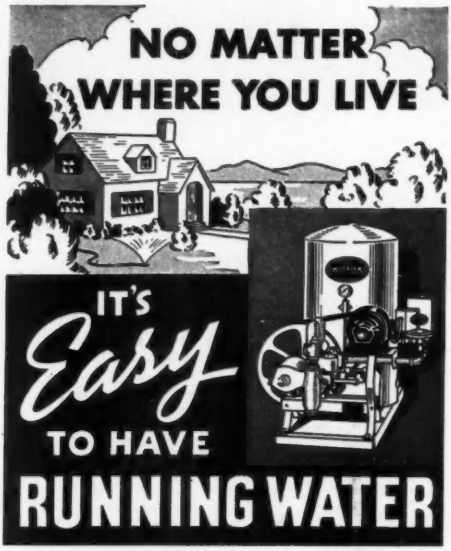
*Compiled from charts prepared by E. W. Schoder.
Note: The friction of a 90-degree elbow is equal to approximately 10 feet of straight pipe.

When water flows rapidly through a pipe, the frictional resistance is high. If a larger pipe is used, the frictional resistance is decreased. The losses for various sizes of pipes and for different rates of flow are given in Table 3. The friction in pipes, the rate of flow, and the amount of water to be delivered determine the size of pipe that should be used for an installation.

Example: What sized suction pipe should be used for the problem described in Figure 1A? Will 1 ¼-inch pipe be large enough?

The total lift for the pump will be the vertical lift of 19 feet plus the equivalent lift due to frictional resistance of the pipe. The frictional lift is obtained from Table 3. Referring to this table, in the left-hand column marked *gallons flowing per minute*, one finds the number 10, which is the capacity of the pump in this problem. From this number following to the right to the column headed 1 ¼-inch pipe, one finds the figure 3.8, which is the number of feet of lift equal to the frictional resistance in 100 feet of pipe. For 200 feet, the friction will be equal to 2 x 3.8, or 7.6 feet. The total suction lift will then be 19 + 7.6, or 26.6 feet. Since a shallow-well pump should not have a suction lift of more than 22 feet, the pump will give trouble and it will not pump 10 gallons a minute.

This means that a larger sized pipe must be used.



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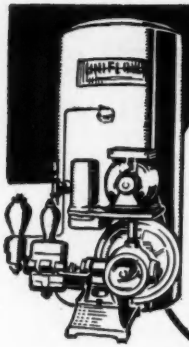

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The Blizzard Ensilage Cutter and Hay Chopper operates with ease and amazing satisfaction with electric power. At Michigan State College 4 silos were filled with a total of 188 tons of ensilage at a total power cost of $5.34 using only a 5 h.p. motor.

Many farmers have found that the Blizzard and electric power make an ideal, profitable combination. Get free catalog at your dealer's or write us direct.

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on brooding chicks with electricity. See your local dealer or write Dept. 31.

ANDERSON BOX CO. Indianapolis, Ind.

Under the column 1¼ *inches* for the next larger sized pipe and for a flow of 10 gallons per minute, one finds the figure 1.5 feet. 1.5 x 2 = 3.0 feet, which is the friction lift for 200 feet of 1¼-inch pipe. 3.0 friction lift + 19 feet vertical lift = 22.0 total suction lift. This works fairly satisfactorily, but a 2-inch suction pipe which gives a total lift of only 20 feet would be much better.

What sized pipe should be used from a spring under the conditions shown in Figure 1B? The spring is 900 feet away and it is 20 feet above the top of the storage tank, and 3,000 gallons of water are needed for the spraying.

In the example given, the frictional resistance was added to the actual lift or head. The pump had to overcome friction plus the amount of the actual lift. In the gravity systems the frictional resistance subtracts from the actual head, or the actual head must be greater than loss of head due to friction, to obtain the rate of flow desired.

To obtain the size of pipe needed, the requirements in gallons per minute must be determined.

In this case, 3,000 gallons ÷ 24 hours = 125 gallons per hour. 125 ÷ 60 minutes = 2 gallons per minute. Will ¾-inch pipe supply this amount under these conditions? Referring to Table 3 under the heading *gallons per minute*, one finds the number 2, following to the right under *¾-inch pipe* one finds that 2.4 feet is the frictional resistance per 100 feet of pipe for water flowing at the rate of 2 gallons per minute. The head of 2.4 multiplied by the number of hundred feet of pipe gives the amount of head necessary to give this flow, or 2.4 x 9 = 21.6 feet. Since the spring is only 20 feet above the top of the tank, the water will not flow at the rate of 2 gallons per minute. With 1-inch pipe, 0.6 foot per 100 feet of pipe multiplied by 9 gives 5.4 feet. Therefore, 1-inch pipe will give a flow of slightly over 2 gallons a minute.

To determine the correct size of pipe to use in the discharge line from the pump or tank to the faucet use Table 4. It is necessary only to know the gallons per minute needed at the faucets and the length of pipe from the pump to the faucet.

Table 4. Diameter of Pipe for Not Over 10 Pounds Pressure Drop in Entire Line

Gallons per Minute	Total Length of Pipe Line in Feet							
	100	200	300	400	500	750	1000	1500
0.5	½	½	½	½	½	½	½	½
1	½	½	½	½	¾	¾	¾	¾
2	½	¾	¾	¾	¾	¾	1	1
3	¾	¾	¾	¾	1	1	1	1
4	¾	¾	1	1	1	1	1	1¼
5	¾	¾	1	1	1	1	1¼	1¼
6	¾	1	1	1	1	1¼	1¼	1½
8	1	1	1	1¼	1¼	1¼	1½	1½
10	1	1	1¼	1¼	1¼	1½	1½	2
12	1	1¼	1¼	1¼	1½	1½	1½	2
14	1	1¼	1¼	1½	1½	1½	2	2
16	1¼	1¼	1½	1½	1½	2	2	2
18	1¼	1¼	1½	1½	1½	2	2	2
20	1¼	1½	1½	1½	2	2	2	2
25	1¼	1½	2	2	2	2	2	2½

The figures in the table above show the size of pipe to use for various lengths of pipe line, so that the loss of pressure due to the frictional resistance will be less than 10 pounds in the entire line for the indicated rates of flow.

Example: What size of pipe should be used from the pump in the house to the barn? Peak load 5 gallons per minute. Barn 300 feet from the pump. Referring to Table 4 in the left hand column under gal. per min. we find 5. Following this to the right under 300 feet we find 1 inch pipe should be used.

The use of the foregoing tables will enable one to plan a water system with the correct size of pump and pipe a system that will give satisfaction and good return for money spent.

ON THE AIR

Conducted by JEROME J. HENRY

An Organist Up a Tree

IRMA GLEN, who plays the pipe organ theme melodies for radio programs and is one of the country's best known women organists, has a new hobby—operating a parking lot, service station, lunch counter and hotel for the many birds which live along the Lake Michigan shore in Chicago. It all began two years ago when the pretty musician tossed a few bread crumbs in her back yard and drew dozens of birds. She was unable to identify many of them and this aroused her curiosity.

First she bought bird books and attended classes in birdlore. Then she installed all sorts of bird houses, bird baths, bird feeding devices and other gadgets to attract her new friends. Now she knows the names of all the birds who visit her place in large numbers.

This past season she had four families of robins, six of wrens and twelve of martins, and pairs of flycatchers, wild canaries, and goldfinch nesting on her property. Quail, whippoorwill, bluejays, bluebirds, cardinals, and many other species dine and bathe under her window regularly.

Lovely Marlyn Stuart, who plays with comedian Ken Murray in the famous Hollywood Hotel cast over Columbia Broadcasting System stations. A former stage star, she was auditioned by telephone for the radio, was signed, and is now making a name for herself both in radio and movies.

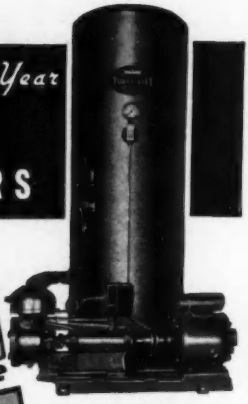
• • •

Kate Smith Plays House

KATE SMITH'S maid has a day off on Thursdays. That is also Kate's day out, the one day in seven when radio's singing mistress-of-

Year After Year NO REPAIRS

It's this Turbine Pump that Makes the Difference



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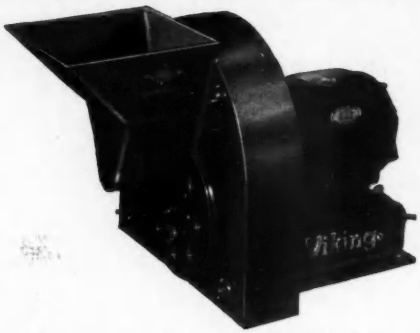

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"What I like best about the Viking hammer mill," says A. W. La Bo, Monroe, Mich., "is its convenience. I can grind any mixture of feed I want and have it fresh. This mill is large enough for any farm. It is 100% in every way and it's easily the most economical way to grind feed. I wouldn't be without it."

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ceremonies is free to play house. And of all places her day at home is back stage at the Columbia Playhouse in Manhattan's noisy 45th Street.

Behind chintz draped doors, within easy hailing distance of the woodwind and brass section of the stage, is Kate's dressing room, done in cottage style in cool blues and greens. There she putters around with pots and pans on a small electric range, when not on stage in rehearsal, preparing snacks for herself, Ted Collins, and the boys in the band.

Hamburgers on stage direct from Kate's grill, mixed with catsup and small talk, are not an unusual thing in the 5-minute breathing spell between rehearsals. There's usually a discussion of the new wall paper in Henny Youngman's spare room at home, chatter about favorite vacation spots, fishing, shop talk of downbeats and the latest popular song, or Jim Crowley's latest football predictions.

It's all extremely informal, even to Kate's fried eggs which are remarkable eggs, according to the gourmets, and are laid with regularity by the hens on Charley Margolis' farm. Charley is bandleader Jack Miller's first trumpet player. He forgot to deliver the eggs several weeks ago and almost caused a musician's strike.

Kate arrives at her backstage cottage the morning of the day of her broadcast and doesn't leave until well after the finish of the broadcast to the West late in the evening. She readily confesses she'd stay there permanently if there were satisfactory sunrises to enjoy on 45th Street.

• • •

SPEAKING of real names: Florence George, opera singer and movie actress heard with Lanny Ross and Charles Butterworth, is Florence Guthrie. She acquired her professional name by combining the given names of her parents. She began her career singing with the Walter Blaufuss orchestra in Chicago.

A Physical Merger

First He: "See that girl? Her face is her fortune."
Second He: "Yeah, and it runs into a nice figure."

And Mars Isn't

Helen: "How is my dog different from the planet Mars?"
Blazes: "Well, how?"
Helen: "We know my dog is inhabited."
—Pitt Panther.

OUR PERFECTED 1938 BROODER

Gives all the usual advantages of electric brooding PLUS: (1) More uniform distribution of heat over entire area covered by the Brooder. (2) Positive circulation of CLEAN air, correctly heated. (3) Least variation in vertical temperature—floor to chick's backs.
Results in Better Grown, Heavier Birds—Lowest Electric Consumption
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The Trumbull Electric Mfg. Co. **1012 Woodford Ave. Plainville, Conn.**

4-H CLUB MEMBERS WIN ELECTRIFICATION PRIZES

SMILES!

Can you blame them? Jesse G. Henry has just been awarded a $400 scholarship and Eunice Kathleen Ball a $300 scholarship as a result of their good work in the Westinghouse 1937 national rural electrification contest.

The contest consisted in drawing a floor plan of the houses and buildings on the farm, showing electrical equipment in use; mapping the location of the farm with respect to the nearest power lines; planning a practical wiring system for all the buildings; and carrying on a club group activity in rural electrification.

Jesse G. Henry, winner of the first prize, is a freshman at Mississippi State College. He is studying agricultural engineering. Calhoun County,

Upper: Jesse Henry wearing a $400 smile. G. A. Sawin of the Westinghouse Co. congratulates him.

Lower: Hello Everybody! Am I happy? This is Eunice Kathleen Ball of Michigan, who won second.

Michigan, claims attractive, eighteen-year-old Eunice Kathleen Ball, winner of the second national prize. Her next move is to study dress designing and home economics at Michigan State College. Nineteen-year-old Edward Weston of Tillamook, Oregon, intends to use his $200 scholarship to attend Oregon State College to study radio and electrical engineering.

Other winners were: Emil Kielbase, Delaware; Conrad H. Linden, Maryland; Betty Sears, New York; Cecil Kuykendall, Arizona; Sarah A. Gainey, North Carolina; Dorothy Daniels, Rhode Island; and Lillian Baribeau, New Hampshire.

Thousands of Club members competed in the national contest, which was under the supervision of state and local club leaders.

With the "Surging" Surge Milk Travels Only 4 inches INSTEAD of 4 feet!

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● Only 4 inches instead of 4 feet to keep clean—easiest to keep clean—cleaner milk. ● It milks faster. ● It gets more milk (less stripping). ● It milks all cows better—a light pull for an easy milker—a heavy pull for a hard milker and a progressively increasing pull on all cows as they are milked out. ● And now—all Stainless Steel! ● Write for the Free fascinating Surge Catalog, proof of superiority, Easy Monthly Terms Offer...and for Free details on the marvelous new *Surge Cooler*. (Please specify which.)

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Since 1858

Questions and Answers

Preparing Kindling

Question: *Is there any way to cut or crush small branches with electric equipment for kindling?* J. M. M.

Answer: I know of no practical machine except a motor driven wood saw.

Cleaning Eggs Electrically

Question: *I would like to know about egg cleaning with electricity.* J. M. M.

Answer: Two companies make small inexpensive egg cleaners operated with electric motors, and there are large automatic machines on the market which clean and grade eggs in one operation.

Water for Irrigation

Question: *I have a reservoir fed by a spring flowing 250 gal. per min. in dry weather. I wish to carry water for irrigation from this reservoir to a field 1,500 ft. distant. The field is 20 ft. below the water in the reservoir but the ground between the field and reservoir is rolling and rises about 10ft. above the water. Can I syphon water over this rise to the field in a 2 in. pipe? I have electric power for pumping at the field but not at the reservoir.* S. H. P.

Answer: Yes you can syphon water over the hill after first priming the pipe by filling it with water. All joints in the pipe must be tight. The water friction in a 2 in. pipe will limit the flow to about 21 gal. per minute which is a pretty small quantity for irrigation by the furrow or flooding method. You could increase the flow by using larger pipe or by installing a booster pump. A syphon of 3 in. pipe will give a flow of about 62 gal. per min. and a 4 in. pipe, 140 gal. A centrifugal pump placed at the discharge end would increase the flow through the 2 in. pipe to about 34 gal. per minute. With a single stage centrifugal pump at the intake end you could pump about 50 gal. per min. through this 2 in. pipe.

Electricity for Heating Homes

Question: *How is electricity used for heating homes, that is, hot air, hot water or steam? At what price must the electricity be available to make it feasible?* B. J. O.

Answer: Electricity has been used in several cities for house heating for a number of years at an off-peak heating rate of 1c per kw-hr. At this rate the cost is probably double that of coal. Electricity is used in these cities to heat large tanks of water at night and the heated water is then circulated through the hot water or steam radiators in the daytime. It may also be circulated through a hot air furnace and the warm air carried to the rooms.

A less expensive way of heating is to use electric-steam radiators or convection type air heaters with separate controls in each room. This system is now used in many homes in California and the South. It is hardly fair to make direct comparisons in coal and electricity costs as electricity saves labor, requires no furnace room or fuel storage and saves on draperies, etc. because of its cleanliness, besides being more convenient and carefree.

I'M PROUD I AM A FARMER

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The COVER Page

KITTY and Mary Libby are members of the eighth grade Home Economics class of the Quarryville, Pennsylvania, High School. When the photographer found them, they were deep in the mysteries of biscuit making. The girls know that their biscuits will be delicious when baked in the temperature-controlled oven of the electric stove. Kitty and Mary and the other girls in their class are very much interested in the titles you are going to suggest for their picture.

The Home Economics class thought you might like to have their biscuit recipe, so here it is:

Drop Biscuits

2 cups flour (sifted before measuring)
2 tsp. baking powder
4 tb. shortening
¾ tsp. salt
1 cup milk

Sift flour, salt and baking powder together, into a bowl. Cut in fat, add milk gradually and stir until a soft dough, which clings to the side of the bowl, is formed. Drop dough from a tablespoon on an ungreased pan and bake in a hot oven (450°F) for fifteen minutes.

MARY MARGARET LYNCH.

Miss Lynch is home economics teacher in the Quarryville High School.—Editor.

Reminders for March

FILE the points on the brooder thermostats and see that they are working properly. Vacuum cleaner attachments are handy for cleaning the inside of brooders.

SEE that your brooder house floors and side walls are tight to prevent floor drafts.

HAVE you oiled the bearings of the shop and washing machine motor recently?

CHECK up the hotbed heating cable and thermostats. If you need new it's time to order.

SPRING work is about to start. Is your plow sharp, the mower in good repair and the harness ready for heavy use? The blustery days of March will be good ones to put finishing touches on equipment repairs.

EXTEND that water line to the hog lot. It will save time this summer.

PAINT spray guns beat brush painting and are much quicker.

SPRING pastures will soon make more milk—and right at the busy season. A milking machine is a good helper.

IS THE vacuum sweeper ready for spring housecleaning?

Unreasonable Bobby

"What's the matter with little Bobby?"
"He has dug a hole and wants to bring it into the house."

You Bet He Does

Bessie, in town with her mother, caught sight of a bald-headed man.
"Oh, mother," she exclaimed, "just see that man! He hasn't a hair on his head. Isn't it sad?"
"Hush!" replied her mother. "He will hear you."
"Oh!" said Bessie, in subdued tones. "Doesn't he know it?"

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Reviewed by T. E. HIENTON

Names and addresses of manufacturers of the articles described in this column will gladly be furnished upon request. Address your requests to What's New Department, ELECTRICITY ON THE FARM, *24 West 40th Street, New York, N. Y.*

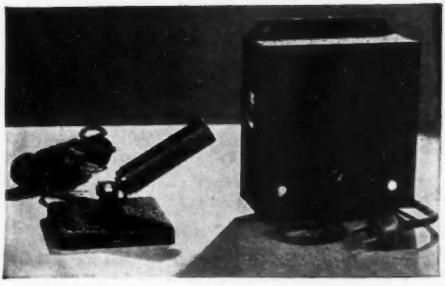
Multiple Use Floor Lamp

Varied are the tasks which must be done by artificial light in the farm home at night. Mother may have some darning or sewing, father his farm accounts to record, and the children some studying to do, all at different places in the house. Electric lighting is doing much to improve the visibility in farm homes where proper lamps are being adopted.

A new multiple-use floor lamp which might be used by any member of the farm household is the product of a middle-western manufacturer. This floor lamp may be used in any fixed position but is so constructed that the plane of lighting can be readily changed over a range of 180 degrees. Standard bulbs up to 150 watts may be used in this lamp.

Electric Eye Burglar Alarm

Thievery is a problem which must be faced by nearly all farmers. Paved roads and high-speed trucks have intensified the problem particularly for the farmer owning livestock or poultry. Electricity is assuming an ever-increasing importance to farmers in meeting the theft problem through lighting of yards and buildings at night or in operation of burglar alarms.



A new burglar alarm has been announced very recently by a manufacturer of the Middle West. This outfit, which may be used on a 110-volt a.c. or d.c. circuit, is built on the use of an "electric eye." An invisible beam of light is projected from a light source to an electric eye and photo-electric robot. Any interruption of the invisible beam of light sets off the alarm which may be located at any distance from the electric eye. The length of the beam may be any amount up to 20 feet as required.

CAN you husk 100 bu. of corn in four hours? Don't be cocky about it. A machine operated by a small motor is being built in Maryland which will butt and husk 2½ tons of green corn in an hour. It is cannery equipment.

A SIGNBOARD seen from the train reads: "What Chester Makes is What Makes Chester." It would apply equally to a farm, particularly a specialty farm. Is the Stickler dairy known for its excellent milk because it is sanitary, uses electric coolers, sterilizers and other modern equipment?

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